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Re: Application Serial No. 09/803,418
Filed: March 9, 2001
Group Art Unit: 3641
Confirmation No: 4815
Examiner: John A. Richardson
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IN RE: APPLICATION SERIAL NO. 09/803,418

FILED: March 9, 2001

GROUP ART: 3641

(Attorney Docket No. RDM 01-002)

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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Examiner: John A. Richardson)
Group Art Unit: 3641) INTEGRAL PWR WITH DIVERSE
In re application of) EMERGENCY COOLING &
LAWRENCE E. CONWAY et al.) METHOD OF OPERATING SAME
Filed: March 9, 2001)
Serial No.: 09/803,418) Attorney Docket No. RDM 01-002

RESPONSE TO FINAL REJECTION

August 27, 2003

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Commissioner for Patents
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Sir:

This is a response to the Office Action for the above application mailed on July 16, 2003. The Office Action Summary indicates under "Disposition of Claims" at 5) that Claims 21 to 36 are allowed; although the check box is not checked, while box 6) is checked but there are no claims identified as being rejected. The "Detailed Action", on the other hand, specifically sets forth rejections of Claims 21-36, and this response is directed to those rejections.

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Rejection of Claims 21-29 Under 35 U.S.C. § 112

Claims 21-29 were rejected under 35 U.S.C. § 112, first paragraph as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention on the grounds that "the term **containment** can read on other structures, for example, the reactor pressure vessel" (emphasis original).

First, the element in question is described as "containment structure" in the claims. Secondly, the "containment structure" of the claims is clearly identified in the specification at numerous points, e.g., page 6, lines 13, 14 and 20, page 7, lines 28, 31 and 32 (over to page 8), page 8, lines 2, 5, 11, 16, 17, 19, 22, 24-25, and 29, page 9, lines 6, 15, 22, and 29, page 10, line 12, page 11, line 6, and page 12, line 18, by the reference character 17. "A fundamental principal contained in 35 U.S.C. § 112, second paragraph, is that applicants are their own lexicographers. They can provide in the claims what they regard as their invention essentially in whatever terms they choose so long as the terms are not used in ways that are contrary to accepted meanings in the art." MPEP § 2173.01.

Applicants have used the term "containment structure" in conformance with the accepted meaning in the art. For instance, see Schulz relied upon by the Examiner in the rejections on the merits, which uses the term "containment structure" **ninety times** referring to the exact same element as Applicants' element 17. Also, Gardner et al., the primary reference relied upon by the Examiner, uses the term "containment building" **twenty-six times** in reference to the exact same element. Often those skilled in the art merely refer to this well-known element as "containment". See Applicants' specification page 2 and the title of the Schulz patent. Clearly, the term "containment structure" used in the claims is described in the specification, and drawings, in conformity with the well-established understanding of the term in the pertinent art so that one skilled in the art would be able to understand and use the invention.

Claims 21-29 were also rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for the same reasons as discussed above in connection with the first

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paragraph rejection. Accordingly, the term "containment structure" meets the definiteness requirements of 35 U.S.C. § 112, second paragraph, for the same reasons.

Rejection of Claims 24 and 25 Under 35 U.S.C. § 112

Claims 24-25 were rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Specifically, it is asserted that the term "gas" does not have an antecedent basis as the claims have not recited gas specifically being present in the containment structure.

Claim 24 depends from Claims 21-23. The limitation "using gas" appears for the first time in this claim sequence at line 4, in Claim 24. There is no basis for a lack of antecedent rejection of Claim 24. As discussed in MPEP 2173.05(e), the lack of an antecedent basis is created when a claim calls for, for an example, "said lever" or "the lever" and there is no previous recitation of "lever" to support the reference back. This is not the case here, as "using gas" is used in line 4 for the first time and does not imply a reference back to a previous reference to "gas". The Examiner seems to be requiring that the claim must state that the gas is provided before it can be stated that a gas is used. However, it is inherent in the phrase "using gas in the at least one suppression tank. . ." that there is gas in the tank. Incidentally, the rejection refers to the lack of any recitation of "gas specifically being present in the containment structure". The gas in Claim 24 is used in the suppression tank, and "using gas" is the active step of the claim and requires no antecedent basis. This step is akin to a method claim reciting "using a hammer to drive a nail". It is not necessary to first call for "providing a hammer", *Id.*

Rejection of Claims 30-36 Under 35 U.S.C. § 102(b)

Claims 30-36 were rejected under 35 U.S.C. § 102(b) as being anticipated by Gardner et al. (US 5,102,616).

Claim 30 is directed, in pertinent part, to a method of operating a PWR having a containment structure containing an integral reactor that includes at least one steam generator mounted together with a reactor core in a pool of reactor coolant in a reactor pressure vessel. In response to a loss of coolant accident, the gas in the containment structure, together with the steam in the containment structure resulting from the accident, is introduced into water in a suppression tank, also within the containment

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structure, to condense the steam. The water from the suppression tank is then selectively transferred to the reactor pressure vessel to keep the reactor core covered with water.

As explained in the Response dated May 21, 2003, Gardner et al. quenches steam from the reactor vessel directly into water in the tank 34. The final rejection does not address this point, but instead, asserts that Applicants are relying upon unclaimed advantages to distinguish over Gardner et al. On the contrary, Applicants clearly set forth at the top of page 4 of the May 21, 2003 response, that Gardner et al. does not introduce steam from within the containment structure into the water and the tank 134, but instead quenches steam taken directly from the pressure vessel 12. It was then stated that Gardner et al. describes a different system, which operates in a different way to achieve a different result than the method set forth in Claim 30. The Response of May 21, 2003 explains how the claimed method works but does not rely on why it works to distinguish over Gardner et al., but instead points out that the specific distinction in steps, *i.e.*, the claim calls for introducing the gas and steam in containment into the water in the suppression tank while Gardner et al. directs the steam directly from the pressure vessel into the suppression tank.

The test of anticipation is whether a method has similar steps that operate in a similar way to achieve a similar result. Applicants have shown above that Gardner et al. uses different steps. The description of the process by which Applicants utilize the pressure generated by the steam formed as water within the reactor pressure vessel boils off into the containment structure as a result of an accident and the statement that the steam is condensed in the suppression tank thereby reducing pressure inside the containment structure were included to illustrate that claimed method operates differently from the Gardner et al. reference and that it achieves a different result. In summary, Applicants have shown that Gardner et al. uses different steps that operate in a different way to achieve a different result and therefore does not anticipate Claim 30.

The Office Action states that Gardner et al. "clearly provides the means for introducing gas/steam resulting from the reactor coolant breaks inside the containment to the suppression tanks items 134 through the collecting vessel item 166 and plurality of pipes items 168, as depicted for example, in figures 11, 13." In

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this respect, in addition to directly quenching steam from the reactor pressure vessel in the suppression tank, Gardner et al. provides a separate heat exchanger 160 in containment that condenses steam **in containment**, and the collecting vessel 166, which gathers the condensate and directs it into the tank 134 through the pipe 168. This is not what is called for in Claim 30. Instead, Claim 30 calls for "introducing the gas in the containment structure together with the steam in the containment structure resulting from the loss of coolant accident **into the water in the at least one suppression tank to condense the steam**" (emphasis added). Gardner et al., on the other hand, condenses any steam in the containment structure and then drips the condensate into the suppression tank. Thus, Gardner et al. does not anticipate Claim 30.

Claim 31 depends from Claim 30 and is therefore patentable over Gardner et al. for the same reasons.

Claim 32 is an independent claim directed, in pertinent part, to a method of operating a PWR that, in response to a loss of coolant accident, introduces gas in the containment structure together with steam in the containment structure resulting from accident into the water and at least one suppression tank to condense the steam, and selectively transfers water from the suppression tank to a flood-up cavity within the containment structure in which the lower portion of the reactor pressure vessel containing the reactor core is disposed. Again, in Claim 32, it is the steam from within the containment structure that is condensed in the suppression tank, not steam taken directly from the pressure vessel or condensate taken from within the containment structure as taught by Gardner et al. Furthermore, Gardner et al. teaches transferring water from the tank 134 either directly or through the tank 58 into the pressure vessel 12. It does not teach or suggest transferring water from the tank 134 into a flood-up cavity in which the reactor vessel is immersed. Though Gardner et al. discloses a chamber 130 around the lower end of the pressure vessel 12, this chamber is normally dry, but contains primary water coolant that might leak from the pressurized water reactor vessel so as to keep the pressure vessel 12 submerged in primary water coolant. See Gardner et al., column 26, lines 50-56. In fact, water that spills into the chamber 130 is pumped by the pump 170 into the tank 134, where it can be pumped directly into the pressure vessel as described previously.

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It is clear, therefore, that Gardner et al. discloses a method of operating a PWR that uses a different arrangement, which operates in a different way to achieve a different result. Therefore, Claim 32 is not anticipated by Gardner et al.

Claims 33-36 all depend from Claim 32 and are therefore patentable over Gardner et al. for the same reasons. Furthermore, Claim 33 calls for using gas compressed during condensing of steam in the at least one suppression tank to transfer the water in the suppression tank to the flood-up cavity. Again, Gardner et al. does not transfer water from the suppression tank to a flood-up cavity. Also, Gardner et al. condenses steam outside the suppression tank and the condensed water just flows by gravity into the tank and does not compress any gas in the tank, which has an open tank and therefore cannot compress gas.

In addition, Claim 36 calls for introducing gas and steam into the water in the at least one suppression tank at a level to transfer a selected amount of the water in the suppression tank to the flood-up cavity using compressed gas and leaving the remaining amount of water for transfer to the pressure vessel by gravity. Gardner et al. does not suggest transferring any water to the flood-up cavity, let alone using pressure of gas generated by condensing steam in the water of the suppression tank, and hence, in no way suggests the novel method of selecting the height of the steam and gas injection to the water in the suppression tank to passively establish the fraction of water directed to the flood-up cavity with the remainder being available for the pressure vessel, if needed. Accordingly, Claim 36 further patentably distinguishes over Gardner et al.

Rejection of Claims 21-26 and 29 Under 35 U.S.C. § 103(a)

Claims 21-26 and 29 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Gardner et al. in view of Schulz (US 5,255,296).

Claim 21 is directed, in pertinent part, to a method of operating a PWR having a containment structure containing an integral reactor comprising at least one steam generator mounted together with the reactor core in a pool of reactor coolant in a reactor pressure vessel wherein the steam generator has a secondary loop extending outside of the containment structure. The method comprises, in response to a loss of coolant accident, circulating cooling fluid through the secondary circuit of the steam generator to withdraw heat from the reactor pressure vessel and extracting the heat

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from the cooling water outside of the containment structure at a rate which, within no more than about three hours, lowers pressure in the reactor pressure vessel to a pressure at or below pressure in the containment structure resulting from the loss of coolant accident, thereby stopping or reversing the mass flow of reactor core from the reactor pressure vessel so that the reactor core remains covered without the addition of water from other sources.

While Gardner et al. shows a steam generator within the pressure vessel, it in no way teaches or suggests using the secondary side of the steam generator during a loss of coolant accident to reverse the mass flow out of the vessel. Instead, Gardner et al. relies upon the injection of water into the pressure vessel, as described above, in order to keep the core covered, and therefore, from overheating. It also uses an additional heat exchanger 160 inside of containment to condense steam for return of the condensate to the pressure vessel. It even uses another heat exchanger 148 outside of containment which cools the water in the tank 134 in the tank 58, but it does not teach or suggest the use of the secondary side of the steam generator during a loss of coolant accident to lower the pressure in the pressure vessel to or below that in the containment structure, to thereby reverse the mass flow out of the pressure vessel as called for in Claim 21.

It was asserted in the Office Action that Gardner et al. discloses the claimed invention except for the specific time period of about three hours, but that this time period would have been obvious since where "the general conditions of the claim are disclosed in the prior art, see for example, the secondary reference Schulz [sic] (Column II, lines 18-35, stating several hours), discovering the optimum or workable ranges involves only routine skill in the art. *In re Aller*, 105 USPTO [sic USPQ] 233."

First, Schulz, which is directed to a gutter system for collecting condensate inside a containment structure merely mentions that "[i]n the event of a nuclear accident, the water in even a large heat sink tank may heat to boiling in several hours". This reference in the "Background of the Invention" section of Schulz referring to the boiling of water in a heat sink tank, which is distinct from the reactor pressure vessel, is totally irrelevant to the issue at hand.

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Secondly, it is important to note that the citation from *In re Aller* relied upon by the Examiner requires that the general conditions of a claim must be disclosed in the prior art before it can be held that discovering an optimal or workable ranges only involves routine skill in the art. In the case of Claim 21, as discussed above, Gardner et al. does not disclose the claimed invention except for citing a specific time period for heat removal. Hence, the predicate for asserting that discovering the optimal or workable ranges involves only routine skill in the art is not present. Furthermore, the secondary reference Schulz is directed to a different process, a time period for water in a heat sink to boil off rather than the time required to lower the pressure within a reactor pressure vessel during a LOCA to reverse the mass flow out of the vessel.

The final rejection while ignoring the fact that none of the cited references, whether taken singularly or in combination, disclose the general conditions of Claim 21 as required by *In re Aller*, asserts that Gardner et al. provides numerous citations "to qualitative time periods of operation." None of these "time periods" remotely suggest the time period for stopping or reversing mass flow from the reactor pressure vessel during a loss of coolant accident. More specifically, column 15, lines 46-51, relates to ensuring that mass and energy transfers between a pressurizer and a vapor lock are "not so rapid". Column 17, line 28-33 refers to a system that "provides a rapid source of make-up water". Column 19, lines 25-27 refers to "rapid heat transfer". Column 19, lines 48+ does not refer to any time periods nor does the reference to column 26, lines 18-29. Column 27, lines 64+ refer to something "eventually" occurring as does the reference to column 28, lines 19-40, the latter of which also refers to coolant being "available immediately". The only temporal references at column 30, lines 39-43, are "as the plant cools down" and at lines 66+, "ultimately". These vague intimations of time, none of which mentions the reduction of pressure in the pressure vessel to or below pressure in the containment structure, are not relevant because the initial requirement of *In re Aller*, that the prior art must disclose the general conditions before it can be held that discovering optimum or workable conditions only involves routine skill, has not been met.

The final rejection also asserts that Applicants are relying upon features not recited in the rejected claims for patentability, i.e., heat exchangers immersed in a pool of water, and heat exchangers stored in a shield building. Applicants are not

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relying on the specific detailed features for patentability. They were mentioned in the Response of May 21, 2003 to point out in the specification specific elements in the disclosed embodiment to explain where the elements of the claims were located. The bottom line is that the references do not teach or suggest extracting heat from cooling water in the secondary circuit outside of the containment structure at a rate which, within no more than about three hours, lowers the pressure in the reactor pressure vessel to a pressure at or below the pressure in the containment structure. Accordingly, Claim 21 is patentable over the cited references.

Claims 22-26 and 29 depend from Claim 21 and are therefore patentable over the references for the same reasons.

Furthermore, Claim 22 adds to Claim 21 that the containment structure includes at least one suppression tank containing water, introducing steam in the containment structure resulting from the loss of coolant accident into the water in the suppression tank to condense the steam, and selectively transferring the water in the suppression tank to the reactor pressure vessel. This claim distinguishes over Gardner et al. for the same reasons discussed in connection with Claim 30. Schulz adds nothing to the teachings of Gardner et al. that would render Claim 22 unpatentable as it does not suggest introducing steam in containment structure into a suppression tank. Hence, Claim 22 further patentably distinguishes over the references.

Claim 24 calls for using gas in the suppression tank above the water in the tank which is compressed by the addition of a gas mixture from the pressurized containment structure to transfer at least some water in the tank to the flood-up cavity. As discussed in connection with Claim 30, neither of the references teaches using gas compressed in the suppression tank to transfer water to a flood-up cavity. Therefore, Claim 24 further patentably distinguishes over the references.

Claim 25 adds features similar to that of Claim 36 and is therefore patentable over Gardner et al. for the same reasons and Schulz adds nothing to Gardner et al. to suggest the claimed method of selecting a level for introducing gas/steam into the tank at a level to determine the portion of water provided to a flood-up cavity leaving the remaining water in the tank for selective transfer to the pressure vessel. Accordingly, Claim 25 further distinguishes over Gardner et al. and Schulz.

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Claim 26 adds to Claim 21 introducing steam and gas in a containment structure into a suppression tank to condense the steam and selectively using the gas in the suppression tank compressed during condensing of the steam to transfer water to the flood-up cavity. Clearly, from the above discussion, this claim patentably distinguishes over Gardner et al. and Schulz.

Rejection of Claim 27 Under 35 U.S.C. § 103(a)

Claim 27 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gardner et al. in view of Schulz.

Claim 27 depends from Claim 26 and ultimately from Claim 21 and is therefore patentable over Gardner et al. and Schulz for the same reasons.

Rejection of Claim 28 Under 35 U.S.C. § 103(a)

Claim 28 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Gardner et al. in view of Schulz and in further view of Sawabe (US 5,278,876).

Claim 28 depends from Claim 21 and is therefore patentable for the same reasons. Furthermore, Claim 28 calls for selectively venting steam from an upper portion of the reactor pressure vessel into the containment structure to ensure equalization of reactor pressure vessel pressure and containment structure pressure at a rate such that following a break in a lower portion of the reactor pressure vessel, the reactor pressure vessel water level does not fall below the top of the reactor core. Sawabe was cited as showing that it is well known to provide reactor pressure vessel head venting. It was concluded by the Examiner that therefore it would have been obvious to incorporate such a vessel head venting means as shown in Sawabe in order to release "non-condensable gases" resulting from abnormal/accident conditions of operation". Sawabe states at column 1, lines 30-33, that such vent lines are used "for releasing or venting non-condensable gases such as nitrogen before start-up of the reactor core, for example" (emphasis added). Sawabe also states at column 5, lines 31-35, that "[a]lthough the vent line 30 is preferably used for venting the fluid 60 from within the dome 36, it could also be used in alternate embodiments providing a passage for channeling a fluid such as water for example into the pressure vessel 12 if desired."

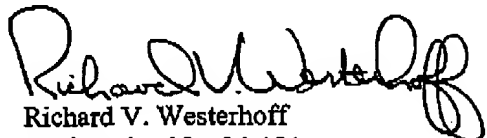
Claim 28 is directed to a method of preventing steam, a condensable gas, from the pressure vessel upon the occurrence of a break in a lower portion of the pressure

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vessel to equalize pressure in the pressure vessel and containment structure at a rate such that the vessel water level does not fall below the top of the reactor core. The mere suggestion by Sawabe of a particular structure for a vent does not by any means teach the claimed procedure and there is nothing in Gardner et al. or Schulz when taken together with the teachings of Sawabe to suggest the method called for in Claim 28. Accordingly, Claim 28 further patentably distinguishes over in combination of the references as applied.

In view of all the above, reconsideration and allowance of the application as now presented is respectfully solicited.

Respectfully submitted,


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